

2. Description of an Abnormal Earthworm possessing Seven Pairs of Ovaries. By M. F. WOODWARD, Demonstrator of Zoology, Royal College of Science, London¹.

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(Plate XIII.)

Abnormalities affecting the genitalia of the Earthworm are of unfrequent occurrence, and, when such variations occur, they, as a rule, only affect accessory structures like the spermathecae and seminal vesicles, not essential ones such as the genital glands.

One or two cases have, however, been put upon record in which the genital glands were themselves affected, although these variations were but slight ones. One case is described by Benham², in which the ovary of the right side was situated on the 12th somite; this might at first sight appear to be a simple shifting forward of the ovary, especially as the oviduct and the posterior termination of the vas deferens of that side are also displaced on to the segment in front of that on which they are normally situated. But when compared with the specimen which I now propose to describe it would appear more probable that the right ovary of Benham's specimen does not correspond with the normal one, but is rather a fresh structure altogether. Bergh³ has also described three abnormal specimens, viz. two *L. turgidus* and one *L. purpureus*, which are of great interest in having undergone an actual reduplication of the ovaries, being possessed of an additional pair on segment 14, the normal ovaries being present as usual on segment 13.

The above-cited cases are, as far as I can ascertain, the only recorded cases of variations in the position and number of the ovaries in *Lumbricus*.

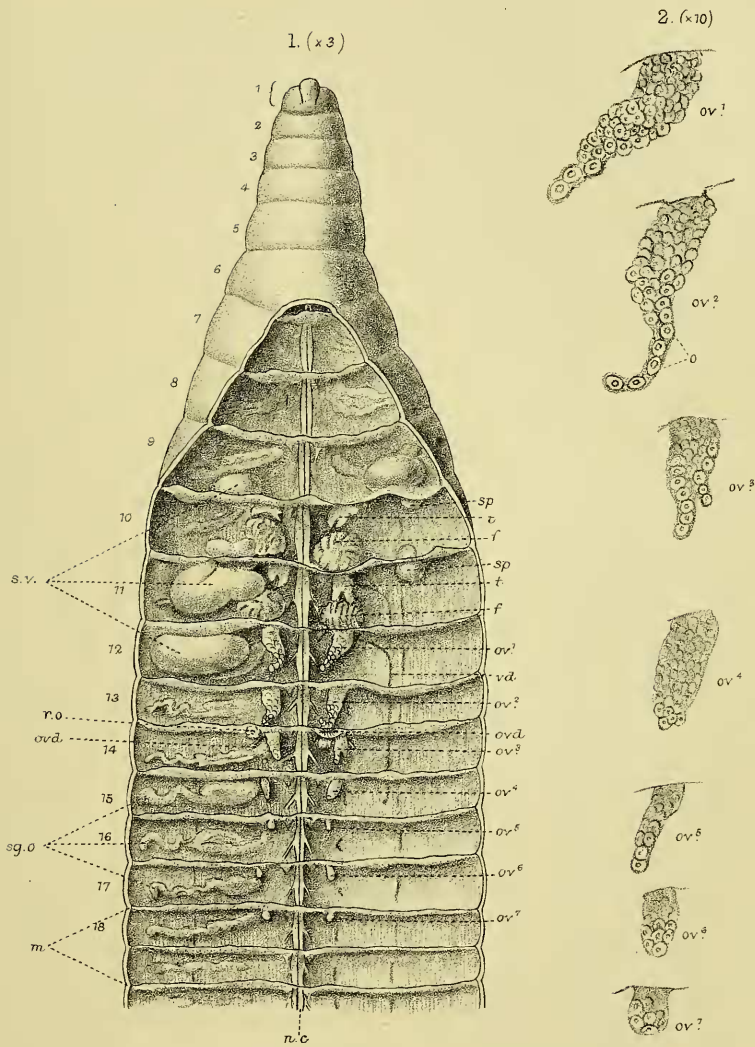
The specimen which forms the subject of the present communication was a large, well-developed common Earthworm (*Allolobophora*, sp. inc.), possessing a well-marked clitellum; it was killed early in November, in which month the genitalia are generally but poorly developed. With the exception of the ovaries the genital organs were quite normal.

On the removal of the alimentary canal one immediately noticed a number of small pear-shaped bodies (Plate XIII. fig. 1, *ov.*¹⁻⁷) projecting backwards from the mesenteries of the segments 11-17. These paired bodies are situated one on either side of the longitudinal nerve-cord, and attached to the posterior face of the mesenteries by their expanded bases, while their apices project back freely into the cavities

¹ Communicated by Prof. G. B. HOWES.

² "Note on a couple of Abnormalities," Ann. & Mag. Nat. Hist. 6th series, vol. vii. (1891) p. 256.

³ "Ueb. d. Bau u. d. Entwickl. d. Geschlechtsorg. d. Regenwurmer," Zeitschr. für wiss. Zool. 1886, vol. xliv. p. 303.



of the somites. The anterior pair (fig. 1, *ov.*¹) was borne upon the mesentery separating the 11th and 12th somites, and immediately dorsal to the coiled portion of the vas deferens which emerges from the latter segment. This pair is slightly the largest.

The 2nd pair (*ov.*²) is situated on the 13th somite, and has all the typical relations of the ovaries as found in the normal worm; facing them, and piercing the mesentery 13/14, we find a small pair of oviducts (*ovd.*) with well developed receptacula ovarum (*r.o.*). Side by side with the latter structures, on the 14th somite, is a 3rd pair (*ov.*³) of these conical white bodies, slightly smaller than those in front, but resembling them in position and structure. On the 15th somite is situated the 4th pair (*ov.*⁴), the members being smaller, of unequal size, and no longer exhibiting the free tapering apex so characteristic of the anterior ones. The 5th, 6th, and 7th pairs of these bodies (*ov.*⁵, *ov.*⁶, and *ov.*⁷) lie respectively on the 16th, 17th, and 18th somites, and show a marked decrease in size; they are relatively rounder and less regularly developed, the members of each pair being often unequal in size; further, those on the 17th somite are slightly larger than the corresponding ones on the 16th.

A rough examination with a hand-lens while the worm was still fresh showed that the free ends of these structures were composed of a number of large rounded cells, which at once suggested ova, especially as the pair of these bodies on the 13th somite possessed all the relations of the typical ovaries of the normal worm.

The specimen was subsequently clarified in glycerine, and subjected to a microscopic examination, which entirely confirmed the last observation. Each of these bodies consisted of a number of rounded cells, smaller at the broad end, and becoming larger and rounder at the free end, the tapering apex being composed of a single row of these large cells (Plate XIII., *ov.*¹-*ov.*⁸, *o.*), in each of which can be seen a large round nucleus and one or two nucleoli.

A comparison with the ovaries of a typical worm shows that the anterior pairs of these structures can in no way be distinguished from them, either in structure, position on their segments, or in shape. The four posterior pairs (fig. 2, *ov.*³-*ov.*⁷), however, rather resemble the ovaries of a very young or immature worm, being rounder and smaller, composed of smaller cells, and only showing one or two large round cells so characteristic of the adult ovary, while they are entirely destitute of that very characteristic free filamentous termination composed of ripe ova.

From the consideration of the above description, together with a comparison of the figures given, there can be no doubt that each pair of these 7 cell-masses is the serial homologue of the single pair of ovaries of the normal Earthworm; so that this interesting specimen, instead of possessing only a single pair situated on the 13th somite, is rich in the possession of seven pairs of ovaries, situated respectively on segments 12 to 18 inclusive.

The condition and shape of the three anterior pairs suggests that they have already been functional in the discharge of ova into the body-cavity; while the four posterior pairs are in a more rudimentary

condition, and possibly have not thus far been functional, although the large size of the cells in some of them does not preclude the possibility of their future maturity.

With regard to the oviducts, although the specimen was most carefully dissected and thoroughly examined, only one pair of these ducts was to be seen, and that in the position of the typical single pair of the normal worm: that is, related to the mesentery between the 13th and 14th somites, opening into the body-cavity of the former and on to the exterior on the latter. And neither externally nor internally could any trace of accessory oviducts be discovered.

It is interesting to note in Bergh's¹ description of the presence of additional ovaries that he, being unable to discover additional oviducts, concluded that the ova from the supernumerary ovaries must necessarily be lost.

This might probably be the case with some of the ova, but if many were shed into the body-cavity (as would happen supposing all these ovaries to be functional), it seems possible that some would find their way through the circum-neural arcade, which puts the various subdivisions of the body-cavity into communication with one another, and through which the perivisceral fluid circulates; and, if so, there would seem to be no difficulty in their finding their way into the 13th somite, and then out through the oviducts.

Beddard² has recently shown reason to believe that "in *Acanthodrilus* the genital funnels and a portion at least of the ducts are formed out of nephridia," and though not definitely proved for *Lumbricus*, it is probable that they are there formed by a modification of the same process. In view of this it seems strange that an animal so rich in ovaries, and with so much material in the way of segmental organs out of which to fashion oviducts, should have only developed a single pair.

Passing from *Lumbricus* to the allied genera, it is not so rare to find the animal normally possessing two pairs of these glands. Beddard has described a number of such forms. Thus, *Perionyx*³ has normally two pairs of ovaries, and is further interesting from the fact that these structures vary in position from the 9th to the 16th segment. *Phreoryctes*^{4 & 5} and *Urochaeta*⁶ possess two pairs of ovaries, situated respectively on segments 12 and 13. Also in *Eudrilus*⁷, *Acanthodrilus*², and *Phreodrilus*⁸ Beddard finds strong evidence for the belief that they also possess an additional pair of ovaries.

¹ *Loc. cit.* p. 308, footnote.

² "On the Homology between the Genital Ducts and Nephridia in the Oligochaeta," P. R. S. Lond. 1890, p. 452.

³ "On a new and little-known Earthworm, with an account of the variations of *Perionyx excavatus*," P. Z. S. 1886, p. 308.

⁴ "Affinities of *Phreoryctes*," T. R. S. Ed. vol. xxxv. p. 629.

⁵ "Reproductive Organs of *Phreoryctes*," Ann. & Mag. Nat. Hist. ser. 6, i. p. 389 (1888).

⁶ "Certain Points in the Structure of *Urochaeta*," Q. J. M. S. n. s. vol. xxix. p. 235.

⁷ "On the Anatomy of Earthworms," Q. J. M. S. n. s. vol. xxx. p. 421.

⁸ "On *Phreodrilus*," T. R. S. Ed. vol. xxxvi. (1890) p. 287.